Annex 1 to the specific part of the examination regulations for the „Sustainable Engineering of Products and Processes“ course of studies with the qualification “Bachelor of Science” at Technische Universität Braunschweig

Module catalogue

The language of a course and its corresponding examination is labeled as follows:

G	course and examination offered in German only
E	course and examination offered in English only
G/E	course and examination offered in English and German
G/E*	language options depend on the elected course

A Compulsory Modules / Pflichtbereich (85 CP)

The following 14 compulsory modules are to be taken:

Fundamentals of Mathematical Science and Information Technology

- Digitale Werkzeuge / Digital Tools (5 LP – D/E)
- Faszination Maschinenbau / Fascination Mechanical Engineering (5 LP – D/E)
- Ingenieurmathematik A / Mathematics for Engineers A (8 LP – D/E)
- Ingenieurmathematik B / Mathematics for Engineers B (8 LP – D/E)
- Regelungstechnik / Control Theory (5 LP – D/E)

Fundamentals of Engineering

- Grundlagen der Strömungsmechanik / Basics of Fluid Mechanics (5 LP – D/E)
- Technische Mechanik 1 / Engineering Mechanics 1 (8 LP – D/E)
- Technische Mechanik 2 / Engineering Mechanics 2 (5 LP – D/E)
- Thermodynamik 1 / Thermodynamics 1 (5 LP – D/E)

Engineering Applications

- Grundlagen des Konstruierens / Fundamentals of Engineering Design (8 LP – D/E)
- Werkstoffwissenschaften / Material Sciences (6 LP – D/E)

Sustainability

- Energy Systems (5 LP – E)
- Environmental and Social Sustainability in Engineering (6 LP – E)
- Sustainable Business Economics (6 LP – E)

B Specialisation Area / Vertiefungsbereich (63 CP)

B1 Sustainable Mobility

Sustainable Mobility – Compulsory Modules (43 CP)

The following 8 compulsory modules are to be taken:

- Aircraft Design (5 LP – E)
- Collaborative Work Sustainable Mobility (8 LP – D/E)
    - Projektarbeit / Project Work (6 LP – D/E)
    - Laborpraktikum / Laboratory (2 LP – D)
- Flugleistungen / Aircraft Performance (5 LP – D)
- Fundamentals of Sustainable Product Development and Engineering Design (5 LP – E)
- Fundamentals of Drive Systems (5 LP – E)
- Multimodal Transport Systems (5 LP – E)
- Numerische Methoden für Mobilitätsanwendungen / Numerical Methods for Mobility Applications (5 LP – D)
- Vehicle Design (5 LP – E)

Sustainable Mobility – Elective Modules (20 CP)

From the following elective modules, 4 modules are to be chosen:

- Einführung in die Messtechnik / Introduction to Metrology (5 LP – D)
- Elemente des Leichtbaus / Lightweight Design in a Nutshell (5 LP – D)
- Future Propulsion Technologies for Sustainable Aviation (5 LP – E)
- Grundlagen der Fahrzeugtechnik / Basics of Automotive Engineering (5 LP – D)
- Grundlagen der Flugführung / Fundamentals of Flight Guidance (5 LP – D)
- Intelligent and Connected Vehicles (5 LP – E)
- Luftverkehrssimulation / Air Traffic Simulation (5 LP – D)
- Mechanisches Verhalten der Werkstoffe / Mechanical Behaviour of Materials (5 LP – D)
- Mobile Arbeitsmaschinen und Nutzfahrzeuge / Mobile Machines and Commercial Vehicles (5 LP – D)
- Modellierung mechatronischer Systeme / Modelling of Mechatronic Systems (5 LP – D)
- Nachhaltige Raumfahrttechnik / Sustainable Space Engineering (5 LP – D/E)
- Schienenfahrzeuge / Railway Vehicles (5 LP – D)
- Technische Mechanik 3 / Engineering Mechanics 3 (5 LP – D)
- Thermodynamik 2 / Thermodynamics 2 (5 LP – D)
- Verbrennungskraftmaschinen und Brennstoffzellen / Internal Combustion Engines and Fuel Cells (5 LP – D)
- Verkehrsleittechnik / Traffic Control Engineering (5 LP – D)

B2 Sustainable Energy and Process Engineering

Sustainable Energy and Process Engineering – Compulsory Modules (43 CP)

The following 9 compulsory modules are to be taken:

- Anlagenbau (MB) / Plant Engineering and Construction (5 LP – D)
- Chemie für die Verfahrenstechnik und Materialwissenschaften / Chemistry for Process Engineering and Materials Science (5 LP – D/E)
- Collaborative Work Sustainable Energy and Process Engineering (8 LP – D/E)
    - Projektarbeit / Project Work (6 LP – D/E)
    - Laborpraktikum / Laboratory (2 LP – D/E*)
- Einführung in numerische Methoden für Ingenieure / Introduction into Numerical Methods (5 LP – D)
- Grundlagen der Mechanischen Verfahrenstechnik (MB) / Basics of Solids Process Engineering (5 LP – D/E)
- Grundlagen nachhaltiger Prozesse der Energie- und Verfahrenstechnik / Fundamentals of Sustainable Processes in Energy and Process Engineering (5 LP – D)
- Grundoperationen der Fluidverfahrenstechnik / Unit Operations in Fluid Separations (5 LP – D)
- Thermodynamik 2 / Thermodynamics 2 (5 LP – D)

Sustainable Energy and Process Engineering – Elective Modules (20 CP)

From the following elective modules, 3 modules are to be chosen:

- Batterien und Brennstoffzellen – Grundlagen, Herstellung und Kreislaufwirtschaft / Batteries and fuel cells – Basics, production and circular economy (5 LP D/E)
- Bioreaktoren und Bioprozesse / Bioreactors and -processes (5 LP – D)
- Chemische Verfahrenstechnik / Chemical Process Engineering (5 LP – D)
- Electrochemical Energy Engineering (5 LP – E)
- Fundamentals of Sustainable Product Development and Engineering Design (5 LP – E)
- Introduction to Micro- and Nanotechnology (5 LP – E)
- Introduction to Sustainable Bioproduction (5 LP – E)
- Prozesssimulation / Process Simulation (5 LP – D/E)

B3 Sustainable Production

Sustainable Production – Compulsory Modules (38 CP)

The following 7 compulsory modules are to be taken:

- Betriebsorganisation / Enterprise Organisation (5 LP – D)
- Collaborative Work Sustainable Production (8 LP – D/E)
    - Projektarbeit / Project Work (6 LP – D/E)
    - Laborpraktikum / Laboratory (2 LP –E)
- Energy Efficiency in Production Engineering (5 LP – E)
- Fertigungstechnik / Production Technology (5 LP – D)
- Finite-Elemente-Methoden / Finite Element Methods (5 LP – D)
- Fundamentals of Sustainable Product Development and Engineering Design (5 LP – E)
- Ganzheitliches Life Cycle Management / Total Life Cycle Management (5 LP – D)

Sustainable Production – Elective Modules (25 CP)

From the following elective modules, 5 modules are to be chosen:

- Aktoren / Actuators (5 LP – D)
- Anlagenbau (MB) / Plant Engineering and Construction (5 LP – D)
- Automatisierung von industriellen Fertigungsprozessen / Automation of Industrial Manufacturing Processes (5 LP – D)
- Einführung in die Messtechnik / Introduction to Metrology (5 LP – D)
- Elektrische Signalverarbeitung / Electric Signal Processing (5 LP – D)
- Fügetechnik / Joining Technology (5 LP – D)
- Grundlagen der Mechanischen Verfahrenstechnik (MB) / Basics of Solids Process Engineering (5 LP – D/E)
- Grundlagen der Mikrosystemtechnik / Fundamentals of Microsystem Technology (5 LP – D)
- Grundlagen nachhaltiger Prozesse der Energie- und Verfahrenstechnik / Fundamentals of Sustainable Processes in Energy and Process Engineering (5 LP – D)
- Industrielles Qualitätsmanagement / Industrial Quality Management (5 LP – D)
- Mechatronische Systeme / Mechatronic Systems (5 LP – D)

C Integrated Modules (8 CP)

The following module is to be taken:

- Überfachliche Profilbildung / Integrated Modules (8 CP – G/E*)

D Internship (10 CP)

The following module is to be taken:

- Betriebspraktikum Maschinenbau / Internship (10 CP)

E Bachelor’s Thesis (14 CP)

The following module is to be taken:

- Abschlussmodul Bachelor SEPP / Bachelor’s Thesis SEPP (14 CP – G/E)